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Addressing Disparity: A Waiting Room Intervention for Preeclampsia Prevention in African Americans

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Addressing Disparity: A Waiting Room Intervention for Preeclampsia Prevention in African Americans

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Abstract

Maternal mortality is a pressing, global concern that particularly affects African American women in the United States. African American women face disproportionately a high maternal mortality rate (MMR), with rates more than double that of white women. Preeclampsia emerges as the leading cause of maternal mortality in African American women, driving the need for targeted interventions. To address this issue, a proposed research study aims to investigate the impact of a nurse-led, waiting room, preeclampsia and aspirin effectiveness educational intervention on the knowledge and preeclampsia rates among African American women. The study draws upon existing evidence that supports the use of low-dose aspirin in preventing preeclampsia. A thorough literature review explores the effectiveness of aspirin in preventing preeclampsia and the impact of educational interventions on women's knowledge and awareness of the condition. This potential study empowers healthcare professionals, particularly nurses, who play a vital role in reducing maternal mortality rates and addressing health disparities among pregnant African American women in the United States.

African hearts strong,

Preeclampsia's grasp is gone,

Health and life prolong

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Maternal mortality is a significant global problem. In a 2023 report examining trends in global maternal mortality rates (MMR), the World Health Organization reported that one woman died every two minutes in 2020. Maternal mortality is defined as "the death of a woman during pregnancy or within 42 days after the termination of pregnancy, regardless of the pregnancy's duration or location, resulting from pregnancy-related or aggravated causes, excluding accidental or incidental factors" (Hoyert, 2022). MMR, quantified as the number of deaths per 100,000 live births, demonstrates the severity of this issue. In 2020, Spain reported an MMR of 3, France reported 8, Japan 4, and Canada 11 (Central Intelligence Agency, 2020). Meanwhile, the United States (US), despite being the highest-spending country on healthcare (Anderson et al., 2019), exhibited a MMR of 23.8, on par with MMR data for Costa Rica (23) and Iran (22).

When considering the demographic distribution of the US MMR, significant health disparities emerge, most drastically affecting African American women. Non-Hispanic White women recorded an MMR of 26.6, while Hispanics reported 28.0. In stark contrast, African American women faced a substantially higher rate of 69.9, more than double that of white women (Hoyert, 2023). African American women are three to four times more likely to die in pregnancy compared to other races, regardless of the woman’s income, education, or geographical location (McLemore, 2019). The maternal mortality rates of the highest-income African American women were found to be just as high as the maternal mortality rates of the lowest-income white women (Moulton et al., 2022). These disparities have persisted, with data from as early as 1979, showing that African American women have died in maternity at disproportionately higher rates than any other race for years. The MMR for African Americans

in 1979 was 25.1, almost a third of what the rate is currently (Flanders-Stepans, 2000). It is apparent not only do these disparities persist, but they are moving in an upward trajectory (Hoyert, 2022).

The leading cause of maternal mortality in African American women is preeclampsia (MacDorman et al., 2021). Preeclampsia is, "persistent high blood pressure that develops during pregnancy or the postpartum period and is often associated with high levels of protein in the urine OR the new development of decreased blood platelets, trouble with the kidneys or liver, fluid in the lungs, or signs of brain trouble such as seizures and/or visual disturbances." (Preeclampsia Foundation, 2023). Preeclampsia affects 1 in 25 pregnancies and presents a 60% higher risk in African Americans (ACOG, 2013). Thus, investigating interventions that prevent preeclampsia in African American women is vital to decreasing the disproportionately high maternal mortality rates.

Problem Statement

One potential approach to reduce maternal mortality among African American women is through the use of a nurse-led preeclampsia and aspirin effectiveness educational intervention in lowering the development of preeclampsia in pregnant women at high risk for the condition. Aspirin helps by inhibiting thromboxane A2 that constricts blood vessels, while still allowing prostacyclin, a vessel-relaxing prostaglandin, to function (Clarke, 1991). Recent research, including a 2021 meta-analysis by the United States Preventive Services Task Force (Henderson et al.) and a 2019 meta-analysis encompassing 74 trials and over 40,000 patients across low, moderate, or high risks of preeclampsia (Duley et al.), reported a significant reduction in preeclampsia with the use of low-dose aspirin (75-162 mg). However, there is a gap in research specific to studying the level of preeclampsia knowledge and use of low-dose aspirin use among

African American women. Therefore, this proposed study will evaluate the effectiveness of a nurse-led educational intervention that exposes African American women to education about preeclampsia prevention and the use of low-dose aspirin early in pregnancy as primary prevention.

Purpose Statement

Maternal mortality, particularly affecting African American women, remains a significant concern in the US. Drawing upon recent evidence of aspirin's efficacy in preventing preeclampsia, this study aims to empower African American women by providing them with vital information and resources about preeclampsia and safe aspirin use. This research strives to address the disproportionately high maternal mortality rates in African Americans in the US by preventing preeclampsia, the leading cause of maternal death in African Americans. This research is particularly relevant for registered nurses, who are well-positioned to promote maternal health through education.

Research Question

How will a nurse-led preeclampsia and aspirin effectiveness educational intervention impact the knowledge and incidence of preeclampsia among African American women in the United States?

Hypothesis

A nurse-led, waiting room, preeclampsia and aspirin effectiveness educational intervention will increase knowledge and lower the incidence of preeclampsia among African American women.

Literature Review

The objective of this literature review is to synthesize the most recent literature on the effectiveness of providing preeclampsia and aspirin education to African American women in hopes of decreasing maternal mortality rates by preventing preeclampsia. The search terms “preeclampsia”, “aspirin”, “African American”, and “education” were used in the following databases: PubMed, Cochrane Collection Plus, and CINAHL. Six articles have been identified and are organized into two themes: Aspirin Effectiveness on Preeclampsia and Preeclampsia Education.

Aspirin Effectiveness on Preeclampsia

The following three articles provide findings on the effectiveness of various aspirin doses on preeclampsia prevention and their level of acceptance of and adherence to aspirin therapy.

Wei Gu et al. (2020) conducted a randomized controlled trial (RCT) to assess the effects of low-dose aspirin on preventing preeclampsia. The trial involved 1,195 high-risk preeclampsia women in Shanghai, China, and were assigned to either: the control group, which received a placebo, or the aspirin group. The aspirin group was subdivided into three subgroups, each receiving different daily doses of aspirin (25 mg, 50 mg, and 75 mg). The administration of aspirin commenced during the 12th week of pregnancy, instructing participants to take it before bedtime. The relationship between aspirin dosage and the incidence of preeclampsia was assessed through several statistical tests, including the Mantel-Haenszel trend test, Pearson's correlation analysis, and odds ratio (OR) calculations. The major finding of this study is that low-dose aspirin decreased the incidence of preeclampsia with a P-value less than 0.5, proving effective as a preventive measure. Notably, the prophylactic benefits of aspirin were greater in individuals with elevated blood resistance values in the uterine artery during early pregnancy. A significant strength of the study is its comprehensive approach using preeclampsia incidence,

maternal and neonatal outcomes, maternal serum biomarkers, and uterine arterial blood flow resistance, to ensure a thorough evaluation of low-dose aspirin's impact. Another strength is the recognition of a dose-dependent relationship between aspirin and preeclampsia prevention, supported by statistical analysis. A limitation of the study is its conduct at a single medical institution in China, potentially limiting the generalizability of its findings to more diverse populations.

In another study also contributing evidence of the effectiveness of aspirin in lowering the incidence of preeclampsia, Huai et al. (2021) conducted a multicenter, open-label, RCT conducted in 13 hospitals across 11 provinces. Study participants were 898 pregnant women between the ages of 18 and 55 with singleton pregnancies (the birth of only one child) and stage 1 hypertension (defined as 130-139 mmHg systolic and 80-89 mmHg diastolic blood pressure by the American College of Cardiology/American Heart Association) who were at high risk for preeclampsia. The researchers defined high risk for preeclampsia if the participant had a history of preeclampsia, diabetes, chronic hypertension, two or more risk factors of obesity, advanced maternal age of 35 years or higher, family history or preeclampsia, or nulliparity (had never given birth). The eligible participants were randomly assigned to the aspirin or control group. The women in the aspirin group received 100 mg of aspirin per day from 12 and 20 weeks to 34 weeks of gestation. The participants' adherence to aspirin administration was monitored throughout the study. The two groups were compared using Student's t-test, and the impact of aspirin treatment was evaluated using logistic regression. The major finding of this study is the aspirin group showed lower incidences of preeclampsia. A strength of this study is its large sample size across 13 hospitals and 13 Chinese provinces, which increases statistical power, generalizability, and more precise estimates of effects. Another strength was the researchers

inclusion of aspirin intake monitoring in their methodology, thereby ensuring that participants actually ingested the aspirin. A limitation is that the study was open-label so participants and researchers knew who was in the control or aspirin group. This leaves room for personal bias and the power of the participant to skew the data by potentially inadvertently influencing reporting adherence to the treatment regimen or subjective measures of pain and discomfort. It's important to consider these potential sources of bias and their impact on the interpretation of the study results. Another limitation is employing only one dosage of 100 mg aspirin. Further research is needed to refine the specificity of aspirin dosage.

The next article investigates the extent to which women would adhere to aspirin recommendations. In an RCT involving 546 low-risk nulliparous women from two maternity hospitals in Dublin, Ireland, Mone et al. (2018) evaluated the feasibility and acceptability of taking routine aspirin compared with taking screening-test indicated aspirin for preventing preeclampsia. The participants were split into three groups. Group 1 received routine administration of 75 mg of aspirin from the 11th week through the 36th week of pregnancy. Group 2 was the control group that took no aspirin. Group 3 received aspirin based on the outcomes of the Fetal Medicine Foundation preeclampsia screening test. The study measured the participant adherence rate and rates of preeclampsia. A major finding was the average adherence rate of 90% among all participants. Regardless of taking routine aspirin or screening-test indicated aspirin, the adherence was 96.0% based on patient-reported diary cards and 95.0% based on tablet counts. 9.9% of the participants exhibited poor adherence, defined as falling below 80%. These statistics underscore the high adherence and suggest that the type of aspirin regimen did not significantly impact patient compliance, reflecting positively on the feasibility and acceptability of aspirin as a preventive measure for preeclampsia. The researchers observed

no difference in preeclampsia outcomes among the groups. They hypothesized that the 75 mg dose was too low and, thus, a contributing factor. In their discussion, the researchers stressed that the study was not designed to detect clinical outcome differences but rather to assess the feasibility and acceptability of aspirin among participants. Another limitation is the open-label design that allows the participants and researchers to influence behaviors and reporting.

Education of Preeclampsia

The following three articles present research seeking to understand the extent of preeclampsia knowledge deficits among pregnant women and the effect of educational interventions designed to increase knowledge about preeclampsia and its prevention.

In Ankara, Turkey, Uğurlu et al. (2021) conducted a study to evaluate the impact of a preeclampsia education and counseling program on women at risk for preeclampsia. The study design used in this research was a single-center, single-blinded, parallel-group, RCT. Participants were 132 pregnant women at risk of preeclampsia in the Gulhane Training and Research Hospital and were divided into a control group and an intervention group, with 66 women in each. The intervention group received standard prenatal care, plus a preeclampsia education and counseling program, that included the use of a preeclampsia education booklet and four counseling sessions. These sessions aimed to promote healthy lifestyle behaviors, increase self-efficacy levels, and raise awareness of early danger signs related to preeclampsia. The control group received standard prenatal care. Both groups underwent assessments and follow-ups using various data collection forms and questionnaires including the Health Promoting Lifestyle Profile-II, the Self-Efficacy Scale (SES), pregnant woman and fetal follow-up forms, and a postpartum data collection form. The maternal and neonatal outcomes were recorded after birth. In the control group, 7.6% of women experienced preeclampsia. In the

intervention group, none of the women experienced preeclampsia. The intervention group also showed significant improvements (P-value < .05) in health-promoting lifestyle behaviors and self-efficacy compared to the control group, as evidenced by a higher total HPLP-II score of 126 points and increased physical activity and breathing exercises. Prior to this publication, little was known about the effects of education and counseling sessions on preeclampsia prevention. A limitation of the study is that these results may not be representative of pregnant women in other regions or with different healthcare access outside of Turkey.

In an RCT involving 113 Jordanian women at high risk for preeclampsia, Alnuaimi et al. (2020), created and delivered an intervention program focused on preeclampsia to test its effect on their preeclampsia awareness and pregnancy outcomes. A questionnaire assessing the women's knowledge of preeclampsia was given to both groups. The intervention group received a 2-hour educational program on preeclampsia, including routine care and self-monitoring of blood pressure and urine protein. The control group received a 2-hour educational program on urinary tract infection and routine care. Pretests were administered at baseline, and post-tests were performed for both groups after a 2-week interval following the intervention, allowing for the evaluation of the program's impact. The results indicate a significant increase (P-value = 0.59) in the mean scores for awareness of preeclampsia among participants in the intervention group who underwent the educational program compared to the control group, from a score of 12.56 to 26.08. The findings are strong evidence that the preeclampsia educational program improves participants' awareness of preeclampsia and pregnancy outcomes. A strength of this study was the use of a comprehensive questionnaire consisting of seven demographic questions and 51 knowledge questions ensuring a thorough evaluation of participants' preeclampsia knowledge. An intriguing element of the intervention was its interactive nature, where

participants physically practiced preventive measures for preeclampsia. A limitation of the study was its small sample size and conducted at a single public hospital in Jordan, which may limit the generalizability of the findings to broader populations or different healthcare settings. Furthermore, the post-intervention assessment occurred only 2 weeks after the educational program. A longer-term follow-up would have provided insights into the sustainability of the program's effects on awareness and pregnancy outcomes.

The next study demonstrates the need to provide knowledge of preeclampsia to women of high risk. Sandsæter et al. (2019) used a qualitative design to investigate the experiences of women with preeclampsia and/or gestational diabetes mellitus. The 17 women in this study had given birth with preeclampsia and/or gestational diabetes mellitus. Focus group interviews were conducted and encouraged participants to freely discuss and share their perceptions and experiences about their birth. The focus group interviews were organized into diagnosis-specific groups, including gestational diabetes mellitus, moderate preeclampsia, and severe preeclampsia. The data collected from these interviews were then analyzed using a systematic text condensation method, which is a four-step strategy of cross-case thematic analysis. This approach allowed the researchers to identify and organize preliminary themes, condense meaning units into artificial quotations, and elaborate on these condensates to answer the research questions. Findings indicated that women with gestational diabetes mellitus and preeclampsia faced challenges in making necessary lifestyle changes during and after pregnancy, often feeling that healthcare professionals minimized the significance of their diagnoses. They expressed a need for better-informed clinicians who understand the importance of well-planned and coordinated treatment and monitoring. Women with severe preeclampsia felt the need for individualized care to process their traumatic labor experiences before making lifestyle changes.

The study identified that women with gestational diabetes mellitus and preeclampsia often felt left to fend for themselves, especially postpartum, lacking systematic follow-up and support for maintaining healthy habits. Participants provided suggestions for the form and content of lifestyle change interventions for women with gestational diabetes mellitus and preeclampsia, emphasizing practical advice and support beyond merely providing information on future cardiovascular disease risk. A notable strength of this study was the timing of the focus group participation, which occurred 3 to 34 months postpartum. This approach minimized the potential for recall bias, a common issue in comparable studies that have a longer interval between birth and interviews. Additionally, conducting face-to-face focus group interviews helped minimize potential distractions during the discussions. The study's limitations include a low recruitment rate and the absence of participants from non-Nordic backgrounds. In one focus group, there were only two participants because of withdrawals just before the start of the interview. All in all, this study underscores the importance of educating high-risk women by providing knowledge and ensuring well-informed clinicians who can offer personalized care and support.

Overall, these six articles demonstrated the themes of Aspirin Effectiveness on Preeclampsia and Preeclampsia Education. The literature strongly supports the use of low-dose aspirin and education is effective as preventative measures for preeclampsia, also demonstrating that most women would willingly take the aspirin and adhere to the prescribed administration regimen. The educational and pharmacological interventions used in these studies hold great potential to reduce MMR in the US. Limitations include single-center settings, small sample sizes, and potential biases.

Learning about these preventative measures enables nurses to assess risk, educate patients, manage medication, and advocate for evidence-based care, ultimately contributing to improved maternal outcomes. This knowledge equips nurses with the tools to better provide the prevention and management of preeclampsia during pregnancy. While existing research has studied the efficacy of aspirin and educational interventions in the prevention of preeclampsia, a gap exists in the current literature when it comes to trialing the impact of a nurse-led educational intervention tailored specifically for African American women. Registered nurses are well-positioned to provide preeclampsia education on the role of aspirin therapy in preventing preeclampsia. This empowers individuals to not only recognize the symptoms of preeclampsia but also to engage in collaborative decision-making with their healthcare provider regarding the use of aspirin for preeclampsia prevention. This potential study will address this important research gap in order in hopes of further reducing the incidence of preeclampsia as this diagnosis is the primary contributor to maternal mortality among African American women.

Research Proposal

This study has been constructed to determine: What is the impact of a nurse-led, waiting room educational intervention on preeclampsia and aspirin's effectiveness in preeclampsia knowledge and preeclampsia rates among African American women in the US?

The proposed study stems from the identified gap in the existing literature, which currently lacks research focusing on preeclampsia education and the effectiveness of aspirin specifically for African American women in preventing preeclampsia. Given the disproportionately high maternal mortality rates and prevalence of preeclampsia among this demographic, it is imperative to address this gap and investigate the potential of an educational

intervention to empower African American women to make informed choices that could reduce their risk of preeclampsia.

Theoretical Framework

The theoretical framework for this hypothetical study draws upon the Health Belief Model, which was initially developed by Irwin M. Rosenstock in the 1950s. The Health Belief Model (HBM) is a widely recognized framework offering insights into how individuals perceive health-related threats and activate preventive behaviors. According to HBM, an individual's health choices hinge on their perception of the severity of a health issue. This theory further postulates that humans respond after weighing the potential advantages and disadvantages of taking preventive measures. Additionally, cues to action, such as information and education, wield a critical influence in shaping behavior (Rosenstock, 9174).

Because HBM serves as the foundational framework for this research design, the approach will be to first assess participants' knowledge, awareness, and perceptions of preeclampsia and aspirin both before and after the educational intervention. The model's emphasis on education and awareness aligns with the study's objective of providing essential information and resources to empower African American women, potentially influencing their choices and actions in reducing the risk of preeclampsia. Participants will be prompted to take necessary preventive actions after evaluating the perceived severity of a health issue and weighing its advantages and disadvantages through education and information.

Primary Research Aims

- To assess the impact of an educational intervention on aspirin's effectiveness in reducing preeclampsia incidence among African American women.

- To determine the level of knowledge and awareness of preeclampsia and increased usage of aspirin among African American women before and after the educational intervention.

Ethical Considerations

Prior to any data collection, informed consent will be obtained from all study participants, ensuring they fully understand the study, their role, and their rights to withdraw at any time. The protection of participants' privacy and confidentiality, as sensitive information about their health and medical history may be collected, will be ensured.

Research Method

Design

This study will use a prospective quasi-experimental cohort design to evaluate how an educational intervention on preeclampsia and aspirin's effectiveness impacts the incidence of preeclampsia in African American women. Participants will be selected through convenience sampling and divided evenly into two groups. The intervention group will undergo the preeclampsia education and aspirin effectiveness education intervention, and the control group will include the data of women from the same clinic who received only standard prenatal care in the past year with no education intervention.

The intervention involves taking one participant at a time from the waiting room before seeing their provider and informing them that they are at high risk. Next, a two-minute video designed to cover key aspects of preeclampsia, its signs and symptoms, risk factors, and preventive measures, including the effective use of low-dose aspirin will be shown. A registered nurse, well-versed in preeclampsia, will oversee the participants' viewing of the video and subsequently address any questions. After the educational session, the participant will promptly proceed to their prenatal appointment with their healthcare provider, where they will have the

opportunity to address any emerging concerns. For patient safety, the registered nurse will relay any issues from the session to the medical provider and ensure that participants engage in a detailed discussion about aspirin use. Participants will be encouraged to obtain written instructions from their doctor regarding the dosage, frequency, and duration of aspirin intake, ensuring clarity on when to initiate and discontinue aspirin use. Upon completion of the video and questions, participants will receive a comprehensive preeclampsia educational bundle (Appendix B) from preeclampsia.org to take home. The intervention will occur during the 12-24-week period of the participant's pregnancy to ensure early exposure.

To evaluate the impact of the educational intervention, a pre-intervention and post-intervention questionnaire will be administered. The questionnaire, originally developed and validated by the Preeclampsia Foundation, was employed in a study conducted by Alnuaimi et al. (2020), and will be used in this study. The questionnaire exhibited a high level of internal consistency, as indicated by a Cronbach alpha score of .94. Five additional questions will supplement the questionnaire and focus on assessing the knowledge level about the safe use of aspirin and its effectiveness. Following the completion of the post-intervention questionnaire, the registered nurse will review the correct responses with the participants to help ensure their safety and comprehension. Participants' health records will be accessed three months postpartum while ensuring anonymity to obtain information on the presence of preeclampsia, aspirin intake, and overall health.

Population

This study focuses on African American women in the United States who are between 12-24 weeks pregnant and at high risk for preeclampsia. This population is disproportionately

affected by the adverse consequences of preeclampsia. This research aims to mitigate maternal health disparities within this demographic group.

Proposed Sample

A sample of at least 128 participants will be enrolled to ensure that the results are generalizable to a larger population of African American pregnant women in the US and able to detect meaningful differences in preeclampsia incidence. G*Power determined that a sample size of 64 participants per group is needed, considering a two-tailed test, 5% significance level (α), effect size of 0.5, and a power of 80% to achieve adequate statistical power.

However, attrition will be considered due to unforeseen circumstances or dropouts, aiming to initially oversample by recruiting more than the required 128 participants. This strategy seeks to hedge against potential attrition, ensuring that the study maintains an adequate sample size for robust data analysis, even if some participants are unable to continue their involvement.

Recruitment Strategy

Participants will be recruited from a single prenatal clinic.

Statistical Methods

Descriptive statistics, including means, standard deviations, frequencies, and percentages, will be used to determine pre/post-test differences, aspirin usage, and preeclampsia incidence. Descriptive statistics will also be used to evaluate the usage of aspirin in each group by tracking whether the patient left the clinic that day with a doctor's order to take aspirin. Inferential statistical methods, including chi-square tests and t-tests, will be used to assess if the differences are statistically significant.

Conclusion

Maternal mortality is a critical issue, especially with the disproportionately high rates among African American women in the US, dying most from the cardiovascular condition of preeclampsia. The primary question of this study was whether a nurse-led, waiting room educational intervention on preeclampsia and aspirin's effectiveness could increase preeclampsia knowledge and reduce preeclampsia rates among African American women in the US. The research findings examined in this thesis strongly support the use of low-dose aspirin as an effective preventive measure against preeclampsia and the crucial role education plays in raising awareness and empowering women to make informed decisions regarding their health.

By understanding the importance of educating pregnant African American women about preeclampsia and the effectiveness of low-dose aspirin, healthcare providers, especially nurses, can play a pivotal role in reducing maternal mortality rates. Registered nurses are well-positioned to provide proactive patient education and counseling that not only gives pregnant women at risk for preeclampsia access to vital information but verifies that they understand and embrace their care plan. This proactive approach can potentially lead to early detection, preventive measures, and improved maternal health outcomes. This research underscores the pivotal role of nurses in patient education and empowerment, emphasizing their responsibility to promote maternal health and reduce mortality rates through education among this vulnerable population.

The next steps in this research involve the actual implementation of the proposed study. Researchers must secure the necessary resources, including funding, personnel, and materials, to execute the educational intervention and data collection effectively. The long-term impact of the educational intervention on preeclampsia rates, as well as its sustainability, must be evaluated through follow-up assessments during and after the pregnancy. The results of this study can inform future clinical guidelines and practices, ensuring that pregnant African American women

receive the necessary information and resources to reduce the incidence of preeclampsia and, ultimately, maternal mortality rates. Future research should include multicenter studies across diverse racial groups and larger sample sizes for further insight. The research journey continues with the hope of improving maternal health outcomes and addressing the disparities that persist in the United States.

References

Alnuaimi, K., Abuidhail, J., & Abuzaid, H. (2020). The effects of an educational programme about preeclampsia on women's awareness: a randomised control trial. International nursing review, 67(4), 501–511. https://doi.org/10.1111/inr.12626

American College of Obstetricians and Gynecologists, Task Force on Hypertension in Pregnancy. *Hypertension in pregnancy. Report of the American College of Obstetricians and Gynecologists' Task Force on Hypertension in Pregnancy.* Obstet Gynecol. 2013;122(5):1122–31.

Anderson, G. F., Hussey, P., & Petrosyan, V. (2019). *It's still the prices, stupid: why the US spends so much on health care, and a tribute to Uwe Reinhardt. Health Affairs*, 38(1), 87-95. https://pubmed.ncbi.nlm.nih.gov/30615520/

Bohren, M. et al. (2017, July 6). *Continuous support for women during childbirth*. https://doi.org/10.1002/14651858.CD003766.pub6

Central Intelligence Agency. (2020). *Maternal Mortality Ratio - Country Comparison*. https://www.cia.gov/the-world-factbook/field/maternal-mortality-ratio/country-comparison/

Clarke, R. J. et al. (1991). *Suppression of thromboxane A2 but not of systemic prostacyclin by controlled-release aspirin.* The New England journal of medicine, 325(16), 1137–1141. https://doi-org.dominican.idm.oclc.org/10.1056/NEJM199110173251605

Duley, L. et al. (2019). *Antiplatelet agents for preventing pre-eclampsia and its complications.* The Cochrane database of systematic reviews, 2019(10), CD004659. https://doi-org.dominican.idm.oclc.org/10.1002/14651858.CD004659.pub3

Fahmy, W.M., Crispim, C.A., & Cliffe, S. (2018). *Association between maternal death and cesarean section in Latin America: A systematic literature review.* Midwifery, pp. 59:88–93. https://pubmed.ncbi.nlm.nih.gov/29421643/

Flanders-Stepans, M. B. (2000). *Alarming racial differences in maternal mortality.* The Journal of perinatal education, 9(2), 50–51. https://doi.org/10.1624/105812400X87653

Henderson, J. T. et al. (2021). *Aspirin Use to Prevent Preeclampsia and Related Morbidity and Mortality: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force*. JAMA, 326(12), 1192–1206. https://doi-org.dominican.idm.oclc.org/10.1001/jama.2021.8551

Hoyert, D. L. (2022). *Maternal mortality rates in the United States, 2020*. Centers for Disease Control: NCHS Health E-Stats. https://dx.doi.org/10.15620/cdc:113967. https://stacks.cdc.gov/view/cdc/113967

Hoyert, D. L. (2023, March 16). *Maternal mortality rates in the United States, 2021.* Centers for Disease Control: National Center for Health Statistics. https://www.cdc.gov/nchs/data/hestat/maternal-mortality/2021/maternal-mortality-rates-2021.htm

Huai, J. et al. (2021). *Preventive effect of aspirin on preeclampsia in high-risk pregnant women with stage 1 hypertension.* Journal of clinical hypertension (Greenwich, Conn.), 23(5), 1060–1067. https://doi.org/10.1111/jch.14149

MacDorman, M. F., Thoma, M., Declercq, E., & Howell, E. A. (2021). *Racial and Ethnic Disparities in Maternal Mortality in the United States Using Enhanced Vital Records*, 2016–2017. American Journal of Public Health, 111, 1673-1681. https://doi.org/10.2105/AJPH.2021.306375

McLemore, M. R. (2019). *How to Reduce Maternal Mortality. Scientific American*, 320(5). Environment Complete database.

Mone, F. et al. (2018). *Trial of feasibility and acceptability of routine low-dose aspirin versus Early Screening Test indicated aspirin for pre-eclampsia prevention (TEST study): a multicentre randomised controlled trial.* BMJ open, 8(7), e022056. https://doi.org/10.1136/bmjopen-2018-022056

Moulton et al. (2022, November). *Maternal and Infant Health Inequality: New Evidence From Linked Administrative Data.* National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w30693/w30693.pdf

Preeclampsia Foundation. (2023, May 31). *What is Preeclampsia.* https://www.preeclampsia.org/what-is-preeclampsia

Preeclampsia Foundation. (n.d.). Preeclampsia Foundation Marketing Store. https://www.preeclampsia.org/shop

Rosenstock IM. Historical Origins of the Health Belief Model. Health Education Monographs. 1974;2(4):328-335. doi:10.1177/109019817400200403

Sandsæter, H. L. et al. (2019). Preeclampsia, gestational diabetes and later risk of cardiovascular disease: Women's experiences and motivation for lifestyle changes explored in focus group interviews. BMC pregnancy and childbirth, 19(1), 448. https://doi.org/10.1186/s12884-019-2591-1

Uğurlu, M., Yavan, T., & Karasahin, K. E. (2021). *The Effect of an Education and Counseling Program on Maternal/Neonatal Outcomes in Pregnant Women at Risk of Preeclampsia.* Puerto Rico health sciences journal, 40(3), 127–135. https://www.researchgate.net/publication/354794536_The_Effect_of_an_Education_and_Counseling_Program_on_MaternalNeonatal_Outcomes_in_Pregnant_Women_at_Risk_of_Preeclampsia

World Health Organization. (2023, February 22). *Maternal mortality*. https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

Appendix A

Literature Review Table

Citation	Study Objective	Sample	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Gu, W. et al. (2020). Effects of low-dose aspirin on the prevention of preeclampsia and pregnancy outcomes: A randomized controlled trial from Shanghai, China. European journal of obstetrics, gynecology, and reproductive biology, 248, 156–163. https://doi.org/10.1016/j.ejogrb.2020.03.038	Assess the efficacy of low-dose aspirin in reducing preeclampsia among women at high-risk of preeclampsia.	Population: High-risk women of preeclampsia. Sample size: 1,195 participants	Randomized control trial (RCT)	Categorized participants into a control group, which received a placebo, and an intervention group, which received aspirin. The aspirin group was subdivided into three subgroups, each receiving different daily doses of aspirin (25 mg, 50 mg, and 75 mg), instructing participants to take it before bedtime. The study obtained preeclampsia rates, d-dimers, platelet aggregation rates, and uterine arterial blood flow resistance.	Low-dose aspirin proves effective as a preventive measure against preeclampsia and early-onset preeclampsia. Its efficacy demonstrates a dose-dependent relationship, with higher doses showing greater prevention potential. The prophylactic benefits of aspirin were greater in individuals with elevated blood resistance S/D values in the uterine artery during early pregnancy.	The recognition of a dose-dependent relationship between aspirin and preeclampsia prevention, supported by statistical analysis.	The study was conducted at a single medical institution in China, potentially limiting the generalizability of its findings to more diverse populations.

Citation	Study Objective	Sample	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Alnuaimi, K., Abuidhail, J., & Abuzaid, H. (2020). The effects of an educational programme about preeclampsia on women's awareness: a randomised control trial. International nursing review, 67(4), 501–511. https://doi.org/10.1111/inr.12626	*Education of Preeclampsia:* Investigate how an intervention program focused on preeclampsia impacts the awareness levels of Jordanian women at high risk for preeclampsia.	Population: Pregnant high-risk preeclampsia women. Sample size: 113 participants.	RCT	Participants were recruited from a public hospital in Jordan. Both groups were given a questionnaire consisting of 51 questions to evaluate the women's awareness of preeclampsia. The intervention group received a 2-hour educational program on preeclampsia, while the control group received education on urinary tract infection and routine care.	Participants who underwent the intervention program had significantly increased mean scores for awareness of preeclampsia compared to the control group.	The use of a comprehensive questionnaire comprising 51 questions ensures a thorough evaluation of participants' knowledge.	The sample size is relatively small. Larger sample sizes might have increased the study's statistical power.

Citation	Study Objective	Sample	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Mone, F. et al. (2018). Trial of feasibility and acceptability of routine low-dose aspirin versus Early Screening Test indicated aspirin for pre-eclampsia prevention (TEST study): a multicentre randomised controlled trial. BMJ open, 8(7), e022056. https://doi.org/10.1136/bmjopen-2018-022056	*Aspirin Effectiveness on Preeclampsia:* Assess the practicability and receptiveness of taking routine aspirin compared to taking aspirin based on screening test results as a preventive measure against preeclampsia.	Population: Low-risk nulliparous women from two tertiary maternity hospitals in Dublin, Ireland. Sample size: 546 participants	RCT	Participants were divided into three groups: Group 1 received routine administration of 75 mg of aspirin. Group 2 served as the control group with no aspirin intervention.Group 3 received aspirin based on the outcomes of the Fetal Medicine Foundation screening test.	The average aspirin adherence among participants was high at 90%. There was a 96.0% adherence with patient-reported diary cards and 95.0% on tablet counts. 9.9% of the participants exhibited poor adherence, defined as falling below 80%.	The report of the 90% average aspirin adherence rate is a strength in itself.	The study utilized an open-label design, meaning participants and researchers were aware of the treatment assignments. This lack of blinding might introduce biases or influence participant behaviors and reporting.

Citation	Study Objective	Sample	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Huai, J. et al. (2021). Preventive effect of aspirin on preeclampsia in high-risk pregnant women with stage 1 hypertension. Journal of clinical hypertension (Greenwich, Conn.), 23(5), 1060–1067. https://doi.org/10.1111/jch.14149	*Aspirin Effectiveness on Preeclampsia:* The study evaluates the preventive effect of aspirin on preeclampsia in the subset of women with stage 1 hypertension.	Population: Pregnant women aged 18-55 with singleton pregnancies and stage 1 hypertension, defined as 130-139 mmHg systolic and 80-89 mmHg diastolic blood pressure. Sample size: 898 participants	RCT	A multicenter, open-label study conducted in 13 tertiary hospitals across 11 provinces. The women in the aspirin group received 100 mg/day of aspirin from 12 to 20 weeks to 34 weeks of gestation, alongside standard antenatal care for high-risk pregnancies. The participants' compliance with aspirin intake was monitored throughout the study. Statistical analysis was conducted using SPSS software.	Women enrolled at or before 16 weeks of gestation, those with stage 1 hypertension had a significantly higher risk of preeclampsia in the control group but not in the aspirin group. The aspirin group in the stage 1 hypertension subset showed lower incidences of preeclampsia at delivery.	The examination of a high-risk pregnant population according to the new ACC/AHA hypertension guidelines.	Larger clinical trials with a more extensive sample size are needed to further confirm these findings. Blood pressure (BP) data used in the study were measured only at the first antenatal care visit before 20 weeks of gestation. Multiple BP measurements over time might provide a more comprehensive evaluation of maternal BP condition.

Citation	Study Objective	Sample	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Sandsæter, H. L. et al. (2019). Preeclampsia, gestational diabetes and later risk of cardiovascular disease: Women's experiences and motivation for lifestyle changes explored in focus group interviews. BMC pregnancy and childbirth, 19(1), 448. https://doi.org/10.1186/s12884-019-2591-1	*Education of Preeclampsia:* This study sought to investigate the experiences of women with preeclampsia and/or gestational diabetes mellitus (GDM), including their motivations/necessity for information and support in making lifestyle changes.	Population: Women with preeclampsia and/or GDM who had given birth between January 2015 and October 2017. Sample size: 17 women	Qualitative research design involving focus group interviews.	Focus group interviews were conducted and aimed to encourage participants to freely discuss and share their perceptions and experiences. The focus group interviews were conducted between November 2017 and February 2018 and were organized into diagnosis-specific groups, including GDM, moderate PE, and severe PE. The data collected from these interviews were then analyzed using a systematic text condensation (STC) method.	Women with GDM and/or preeclampsia faced challenges in making necessary lifestyle changes during and after pregnancy, often feeling that healthcare professionals trivialized their diagnoses. They expressed a need for better-informed clinicians who understand the importance of well-planned and coordinated treatment and monitoring. The study identified that women with GDM and/or PE often felt left to themselves, especially postpartum, lacking systematic follow-up..	The timing of the focus group participation, which occurred shortly after childbirth, was a strength. This approach minimized the potential for recall bias, a common issue in comparable studies that have a longer interval between birth and interviews. Additionally, the use of diagnostic codes allowed for a clear differentiation between moderate and severe PE cases. Also, the use of face-to-face focus group interviews helped minimize potential distractions during the discussions.	The study has limitations, including a low recruitment rate and the absence of participants from non-Nordic backgrounds. In one focus group, there were only two participants because of withdrawals just before the start of the interview.

Citation	Study Objective	Sample	Study Design	Study Methods	Major Finding(s)	Strengths	Limitations
Uğurlu et al. (2021). The Effect of an Education and Counseling Program on Maternal/Neonatal Outcomes in Pregnant Women at Risk of Preeclampsia. Puerto Rico health sciences journal, 40(3), 127–135. https://pubmed.ncbi.nlm.nih.gov/34792926/	*Education of Preeclampsia:* The purpose of this study is to assess the impact of an educational and counseling program on healthy lifestyle behaviors, self-efficacy, and maternal/neonatal outcomes in pregnant women at risk for preeclampsia.	Population: Pregnant women at risk of preeclampsia and attending an antenatal clinic for routine care at the Gulhane Training and Research Hospital in Ankara, Turkey, from May 2015 through March 2016 Sample size: 132 women, with 66 participants in each of the control and intervention groups.	Single-center, single-blinded, parallel-group, prospective RCT..	The intervention group received a preeclampsia education and counseling program, which included the use of a specially prepared preeclampsia education booklet and four training and counseling sessions. The control group received standard prenatal care but did not receive any counseling or training from the researchers. Both groups underwent assessments and follow-ups using various data collection forms and questionnaires, and maternal and neonatal outcomes were recorded after birth.	The intervention group showed improvements in health-promoting lifestyle behaviors and self-efficacy compared to the control group, as evidenced by higher HPLP-II scores and increased physical activity and breathing exercises. Preeclampsia occurred in 7.6% of women in the control group, while none of the women in the intervention group experienced it. Both groups had a similar incidence of gestational hypertension.	Contributes valuable insights to the literature, as few studies have explored the effects of education and counseling on pregnant women at risk of preeclampsia.	Additional research should be carried out with larger sample sizes to more comprehensively assess the impact of educational and counseling interventions on maternal and neonatal outcomes among pregnant women at risk of preeclampsia.

Appendix B

Preeclampsia Patient Bundle